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ABSTRACT

The purpose of this study is to account for the spatial distribution of school systems in the United States that had adopted High School Geography Project (HSGP) materials as of October 1970. A history and description of HSGP opens the study. The premise that the distirubution of materials has not occurred by chance is stated. Factors isolated and hypothesized as affecting the distribution are wealth of individual school systems; the presence and number of high school geography teachers; and the presence of influencing agents, identified as members of the project's steering committee, authors and consultants, educators attending resource personnel workshops, and trial teachers. Methodology includes the application of geographic techniques to illustrate data and convert data into comparable units; thus, location quotients are used to measure the degree to which a state has more or less than its share of HSGP schools, wealth, and teachers. Nearest neighbor analysis techniques are employed to correlate the effects of influencing agents. Data reflecting all of the analysis is appended in the study. The conclusion states that though psychological influences not measured in this study should logically be taken into account, the effect of exposure to new materials is a prime determinate of their adoption. (JH)

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HSGP: FROM BOULDER TO BOONDOCKS

by

Richard D. Geib

A Research Paper Submitted to
the Graduate Faculty of the Department of Geography
in partial fulfillment of the requirements for
the degree of Master of Arts

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Richard D. Geib

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INTRODUCTION

Whether high school geography has been taught as a world regional or a systematic course, the teaching strategies have generally relied heavily on the standard textbook supplemented with a few visual aids. Frequently, learning has centered around place-name identification and rote memorization of trivial facts. The nature of geography as a discipline and an application of its principles seldom have been stressed. The student inevitably has become swamped with facts of dubious significance often presented in an unrelated manner. Prior to the early 1960's, curriculum change and innovation common to other fields seemed to evade the grasp of geography. During the last decade, however, efforts were made to improve the state of geography in the curriculum.

A recent innovation in high school geography has been the development of the High School Geography Project materials. Project activity was terminated in 1970 with its publishing tasks assigned to Macmillan Company.[1]

The High School Geography Project was a collection of geographers and teaching specialists who sought to revitalize geography as a high school subject. An attempt was

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[1] Donald P. Patton, ed., From Geographic Discipline to Inquiring Student (Washington, D.C.: Association of American Geographers, 1970), pp. 80-81.

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made to take emphasis away from memorizing, note-taking, lecturing, and reading. Greater attention was paid to designing role playing games, problem solving, group activities, and discussion. Conceptual thinking was the keynote. It was hoped that students would be able to formulate ideas and apply concepts rather than only regurgitate facts. To meet these objectives, new materials were designed and tested in the classroom. The efforts of the members of the High School Geography Project have resulted in a year long, six unit package of teaching materials. The six units and their accompanying teaching kits are known collectively as the High School Geography Project materials or HSGP materials.[2]

Unit One of the High School Geography Project is entitled Geography of Cities and deals directly with the settlement patterns and characteristics of men as an urban creature. Site characteristics, city structure, factors influencing the growth and decline of cities, the significance of cities in man's life, and the resources that particular cities offer are points emphasized in Unit One. Basic skills in interpreting maps, aerial photographs, charts, and models are taught by allowing the student to work with these materials.

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[2]Geography in an Urban Age (New York: Macmillan Company, 1970), p. 1.

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Manufacturing and Agriculture, Unit Two, deals with the spatial characteristics of manufacturing and farming. Through a variety of activities, the students learn of the problems inherent in facilitating agricultural and industrial enterprises.

Cultural Geography is the focus of Unit Three. Students become aware of various cultural traits and attitudes throughout the world and see how these attitudes affect and effect economic and social ways of life. Emphasis is also placed on cultural diffusion and change.

Unit Four, Political Geography, deals with the interplay between geography and politics. The territorial expressions of political decisions are examined so that students have some idea of the territorial system in which politics take place. Emphasis is placed on how this territorial system affects political processes and, conversely, how political processes affect the territorial system. Students deal with such problems as redistricting, solving boundary disputes, and problems of metropolitan government.

The central theme of Unit Five, Habitat and Resources, is man-land relationships. Through a series of activities, students examine the relationship between human activity and the natural or changed characteristics of a particular areal location. Problems of resource management and pollution are studied as are reasons for similar habitats being

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used differently by people of varying cultural tradition and technological capability.

Through Unit Six, Japan, an effort is made to present students with an opportunity to apply information acquired from and models used in the earlier systematic units within a regional framework. The growth of Japan during the last hundred years is studied using data in tabular, graphic, and map form. Students gain experience working with and analyzing data.

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BACKGROUND AND STATEMENT OF PROBLEM

Since their inception, HSGP materials have found their way into a number of high schools throughout the United States. Some schools use the entire six unit package while others use one or more individual units. The spatial pattern of school systems using HSGP materials is strongly non-uniform in nature. Some parts of the United States have a greater concentration of HSGP adoptors than do others. The varying pattern of secondary school systems in the United States using HSGP materials can be seen on Figure 1. Examination of this map shows that some areas of the country have a definite concentration of school systems using HSGP materials while other areas exhibit little or no concentration. The Northeastern area of the country has a heavy concentration as does the Midwestern area. The South and majority of the West have only scant numbers of HSGP using school systems. There is a fairly heavy concentration along the extreme West coast and a moderate concentration along the North-West coast.

The history of the High School Geography Project can be traced from the Spring of 1959 to September of 1970. During this period of approximately eleven years, scores of individuals worked together to develop the present HSGP package. Contributions were made by educators, both at the high school and college level, and individuals with special

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skills suitable for particular units. The financial expenditure involved approximately two and one half million dollars.

It is obvious that the time, money, and effort involved in the development of the HSGP materials was not slight. One might inquire as to the results of these efforts. Has the adoption of HSGP materials been widespread or only slight? Has the pattern of acoption in school systems been uniform or is it concentrated in some areas and lacking in others? These questions seem pertinent in view of the great deal of time and effort involved in the Project. Answers to these questions are of particular relevance to individuals who were involved with the Project, and to this author who has been recently exposed to the HSGP innovation.

The purpose, then, of this study will be to explain or account for the spatial distribution of school systems in the United States that have adopted HSGP materials as of October, 1970. The overall distribution will be described and study made of factors which are thought to contribute to their distribution.

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HYPOTHESES

The basic premise of this study involves the notion that the variation in the spatial distribution of school systems using HSGP materials has not occurred by chance; instead, it is related to several social and economic factors.

One factor assumed to be related to the distribution of HSGP material users is the financial capability of the respective school systems. The materials necessary to implement HSGP activities in the classroom must be purchased from Macmillan Company. The expense incurred for equipping a class of thirty students is not slight. The per unit cost for equipping a class of thirty students is as follows: Unit 1 -- $330.00, Unit 2 -- $97.00, Unit 3 -- $37.50, Unit 4 -- $60.00, Unit 5 -- $76.00, and Unit 6 -- $40.00.[3] It is argued herein that this expense could be an important factor in determining whether or not a school system accepts HSGP materials.[4] Thus, it is argued, a school system that is financially well endowed is more likely to spend the necessary monies for an innovative technique than one which is not so prosperous. It is

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[3] Macmillan Company, 1970.

[4] A survey of local school systems revealed that the average cost of textbooks for a class of thirty students is approximately $120.00.

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hypothesized, therefore, that a positive relationship will exist between HSGP adoption and school system wealth.

The six unit HSGP package is designed, primarily, to be used in geography courses. It would appear that a high school without a geography teacher is not as likely to use HSGP materials as a school where geography teachers are included on the staff. Likewise, a high school with three geography teachers is more likely to use HSGP materials than a school with only one geography teacher. The greater the number of geography teachers, the greater the chance of one of them seeking a new, innovative, technique to improve the geography curriculum. A second factor assumed to be related to the distribution of HSGP using school systems, then, is the presence and number of geography teachers. A positive relationship should exist between the proportion of geography teachers in any state and the presence of HSGP adoption in that state.

Exposure is often the most significant factor in facilitating the diffusion of an innovation.[5] An individual who has been exposed to an idea or concept can spread his knowledge to others and perhaps be influential in their adopting the same concept. The third and most important factor assumed to be related to the distribution of

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[5] Ronald Abler, John Adams, and Peter Gould, Spatial Organization (New Jersey: Prentice Hall, 1971), pp. 388-409.

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HSGP users is the presence or influence of what this author will call influencing agents. Influencing agents refer to those individuals who were involved in the developmental and experimental stages of the Project. These people fall into four groups. The first includes the members of the Project's Steering Committee. The Steering Committee was responsible for the direction and design of the Project's work. Members served on a voluntary basis, apparently hoping their efforts would improve the design of the geography curriculum in high schools across the country. Members of the Steering Committee were in a position to play a significant role in exposing others to HSGP ideas and materials. Chiefly professional geographers, their presence in a geographic area could be an important factor in the use of HSGP materials in that area.

The second category of influencing agents includes unit authors and consultants. Unit authors were those people who were responsible for the original drafts of the units themselves. As authors, they received assistance from consultants with special skills related to the particular units. This participation again indicates an enthusiasm for the High School Geography Project and a likelihood that a given author or consultant would overtly encourage the adoption of HSGP materials in a nearby school system.

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Starting in the summer of 1968 and continuing each summer through 1971, Resource Personnel Workshops were held to acquaint teams of educators across the country with HSGP materials. These workshops lasted three to four weeks. Each team attending the workshops designed a plan to implement HSGP materials in their respective school systems.[6] One of the members of each team was a college instructor who specialized in instructional methods for secondary teachers. These instructors had the potential ability to expose many of their students who were preparing to teach high school to HSGP materials. A geographic area typically draws from a nearby university for new members of the teaching profession. It is apparent that an institution of higher learning that exposes future teachers to HSGP materials greatly enhances the probability of a surrounding school taking to employ an educator who has been exposed to HSGP adoption.

The final group of influencing agents are trial teachers who tested HSGP materials in their classrooms during the development of the entire six unit package.[7] Their willingness to try out the materials without financial reward apparently indicates an open-mindedness, of sorts,

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[6] George Vuicich, RPU'S: A Model for Training Geography Teachers? (Paper to be presented at April meeting of Association of American Geographers, 1972).

[7] Donald P. Pattan, pp. 73-79.

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toward educational improvement. Conferences, social activities, and the like afford an opportunity for teachers from different school systems to come together. These occasions could conceivably lead to the spread of the HSGP innovation.

The influence of Steering Committee members, unit authors and consultants, Resource Personnal Workshop attenders, and trial teachers could easily extend outside their immediate environs or school systems. Association with other teachers and educators could lead to the diffusion of the HSGP concept and the potential adoption of HSGP materials. A strong positive relationship should exist between these influencing agents and HSGP adoption.

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METHODOLOGY AND ANALYSIS

Initiating the analysis first involved a depiction of the spatial arrangement of school systems using HSGP materials. "School systems" will refer to public secondary school systems for the remainder of this paper as little, if any, HSGP materials are used in public elementary schools. This spatial arrangement can be seen on Figure 1. Table 1 lists the school systems using HSGP materials by state.

The fact that some areas of the country have a greater concentration of HSGP using school systems partially may be a function of the fact that these same areas have more school systems than other areas. Visual study of Figure 1 would indicate that some areas of the country have more than their share of school systems using HSGP materials. This may in fact be true, but it is also possible that the reason an area appears to have more than its share of HSGP using school systems is because it merely has a larger total number of school systems.

A more accurate reflection of areas that contain more or less than their share of school systems using HSGP materials requires that the impact of a large number of school systems be taken into account. A method of doing this is afforded through the use of location quotients. A location quotient is a ratio of ratios. A descriptive

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statistic, it is used to measure the degree to which a specific region or area has more or less than its share of a particular phenomena.[8] Calculation of location quotients requires that individual areal units be compared with a larger areal unit. The United States lends itself to this type of study as it is composed of fifty individual states. If we wanted to know location quotients for each of the fifty states based on the degree to which they have accpted HSGP materials in their school systems, we would perform the following calculations:

$$\frac{\dfrac{\text{Number of school systems in the state using HSGP materials}}{\text{Total school systems in the state}}}{\dfrac{\text{Number of school systems in the U.S.A. using HSGP materials}}{\text{All school systems in the U.S.A.}}}$$

If a state has a location quotient greater than 1.00, it has more than its share of school systmes using HSGP materials. The inverse is also true.

Location quotients based on HSGP adoption were calculated for forty-eight of the fifty states.[9] (The nearest neighbor analysis employed in this research requires a completely contiguous areal unit. Alaska and Hawaii were

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[8]Jenn Alexander, Economic Geography (New Jersey: Prentice Hall, 1963), pp. 594-595.

[9]U.S. Department of Health, Education, and Welfare, Education Directory Public School Systems: 1970-71 (Washington, D.C.: U.S. Government Printing Office, 1971), p. 8.

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therefore omitted as they would have a disproportionate effect on the results of the nearest neighbor analysis.) Figure 2 shows the variation by quartiles. Table 2 lists the states from high to low based on their location quotients.

Figures 1 and 2 show a degree of similar spatial patterning. They also show several contrasts. There are thirty-seven states with school systems using HSGP materials (see Table 1). There are twenty-one states with more than their share of HSGP using school systems (see Table 2). Comparison of Tables 1 and 2 shows that six of the top twenty-one states with the greatest number of school systems using HSGP materials have less than their share of HSGP using school systems when expressed as location quotients. Washington, Michigan, Nebraska, New York, Missouri, and Ohio fall into this category. This is an example of how numbers alone are often inadequate when showing spatial agglomeration and indicates why location quotients are often helpful as indicators of spatial concentration.

As mentioned earlier, acquisition of HSGP materials incurs no small expense and could be a significant factor in determining whether or not a school system purchases HSGP materials. If, as was earlier postulated, HSGP adoption is related in part to school system wealth, it would follow that states with more or less than their share of school systems using HSGP materials would have a

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corresponding share of wealth. This was tested by calculating location quotients for forty-eight states. Calculation of the location quotients required that the percentage of funds allotted to elementary schools per state be calculated and subtracted from state totals. The formula used was as follows:

$$\frac{\dfrac{\text{Funds available for secondary schools, per state}}{\text{Number of secondary schools per state}}}{\dfrac{\text{Funds available for all secondary schools in U.S.A.}}{\text{Number of secondary schools in U.S.A.}}}$$

The location quotients are listed by state, from highest to lowest in Table 3, and are mapped by quartiles on Figure 3. The data used as a measure of wealth were revenue and non-revenue receipts.[10] Revenue receipts constitute the main portion of school income and are defined as "additions to assets which do not increase the school indebtedness and do not represent exchanges of school property for money."[11] They are derived mainly from State, Federal, and County taxes. Non-revenue receipts are defined as "those receipts which either incur a future obligation or change the form of an asset from real and personal property to cash and therefore decrease the net amount and value of real and

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[10] U.S. Department of Health, Education, and Welfare, Statistics of State School Systems, 1967-68 (Washington, D.C.: U.S. Government Printing Office, 1970), pp. 49-52.

[11] U.S. Department of Health, Education, and Welfare, pp. 9-10.

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personal school property."[12] Included in this category is money received from sale of lands and money received from loans. Revenue and non-revenue receipts constitute the major portion of school system finances and are reasonably accurate indicators of school system wealth.

Comparison of Tables 2 and 3 shows that of the twenty-one states with more than their share of school systems using HSGP materials, eleven have more than their share of wealth. A statistical test was sought which would give a clearer indication of the relationship between school system wealth and HSGP adoption.

Phenomena that can only be measured by a presence or absence, yes or no, user or non-user, etc., belong to a nominal scale category. A nominal scale is the lowest level of measurement and classifies phenomena that are mutually exclusive, non-overlapping typologies.[13] Thus, the presence or absence of HSGP materials in a school system must be classified as a nominal scale variable. In this case, either a school system uses HSGP materials or it does not.

School system wealth per state can be measured in exact numbers of dollars. Not only is it possible to

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[12] U.S. Department of Health, Education, and Welfare, pp. 10-11.

[13] Sidney Siegel, Non-Parametric Statistics (New York: McGraw Hill Company, 1956), pp. 22-23.

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determine which states have more wealth per school system but it is also possible to measure this difference in exact numbers of dollars. This characteristic puts school system wealth into an interval scale category. When the ranking of the observations of a given phenomena is possible, and when the distances between the rankings can be measured, an interval scale exists.[14] The problem, therefore, is how to measure the significance between a variable that belongs to a nominal scale and a variable that belongs to an interval scale.

An ordinal scale variable contains the properties of a nominal scale but it also possesses a greater than-less than characteristic. In other words, the observations of a phenomena can be ranked. Various statistical tests are available for analyzing ordinal scales data.

The variable, school system wealth, possesses the properties of an ordinal scale. When the problem variable, (HSGP adoption), is depicted in terms of location quotients and these quotients are ranked, the problem variable also takes on ordinal scale properties.

One of the best known statistical tests for ranked data is the Spearman rank correlation coefficient. It requires that both variables be measured in an ordinal or interval scale so that the observations under study may be

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[14]Sidney Siegel, pp. 26-28.

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ranked in two ordered series. The formula for calculating the Spearman coefficient is as follows:

$$r = 1 - \frac{6 \sum D^2}{n(n^2-1)}$$

where

D^2 = rank of x - rank of y

n = number of observations

$\sum D^2$ = sum of the differences between rank of x and rank of y

The value of the coefficient ranges from 0 to $\pm$1.00; the closer to $\pm$1.00 the greater the correlation.[15] The coefficient was calculated for school system wealth and HSGP adoption and the coefficient obtained was 0.313, significant for forty-eight observations at the .05 level.[16] An apparent positive relationship does exist between school system wealth and HSGP adoption.

Nine states with more than their share of HSGP adopting school systems had less than their share of school system wealth. Colorado, Wyoming, Illinois, Wisconsin, Minnesota, Oregon, Iowa, New Jersey, and Delaware are in this category. Since HSGP adoption in these states is apparently not a function of financial status, other factors must be contributing to the concentration of HSGP adopters. The hypothesis would assert that influencing

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[15] Sidney Siegel, pp. 23-25.

[16] Sidney Siegel, p. 212.

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agents or geography teachers are affecting the degree of HSGP acoption in these states. This possibility was partially tested by examining the relationship between the presence of geography teachers and HSGP adoption.

A positive relationship was assumed to exist between the degree of HSGP adoption in an area and the degree to which geography teachers comprise all teachers in that area. Location quotients were calculated for the forty-eight states and are listed by state in Table 4. They are mapped by quartiles on Figure 4. The relationship was tested using a Spearman rank-order coefficient and a coefficient of -0.100 was obtained, well below the .05 level of significance.[17]

While it appears that little relationship exists between the spatial concentration of geography teachers and HSGP adoption on a nation-wide basis, an interesting observation can be made when one compares Tables 2, 3, and 4. Of the nine states with more than their share of HSGP adopting school systems, but less than their share of wealth, six have more than their share of geography teachers. Two of the remaining three states, Wisconsin and Delaware, have slightly less than their share of geography teachers. New Jersey has significantly less. It is interesting to note the degree to which these three

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[17] Sidney Siegel, p. 212.

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states possess influencing agents as they exhibit little or no relationship with school system wealth or the presence of geography teachers.

Comparison of Tables 2, 3, and 4 shows that while little if no relationship exists concurrently between HSGP adoption, school system wealth, and the proportion of geography teachers for all forty-eight states, the states with location quotients of .75 or higher are markedly similar on all three Tables. This could indicate a threshold or tipping level, beyond which a noticeable relationship exists between HSGP adoption, school system wealth, and the presence of geography teachers.

The presence of influencing agents is the final variable assumed in this study to be related to the distribution of HSGP adoption and is considered the most significant. Trial teachers, unit authors and consultants, Steering Committee members, and Research Personnel Workshop attenders expressed an enthusiasm for the High School Geography Project by their personal involvement with the materials. It is quite likely that they would adopt one or more of the HSGP units in their own classes as well as expose their fellow educators to HSGP materials, thus enhancing the probability of a surrounding area adopting a HSGP unit. The locations of these influencing agents are shown in Table 5 and Figure 5.

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Analysis of the relationship between the presence of influencing agents and HSGP adoption by means other than visual comparison of maps is not a simple task. Comparison on a state by state basis is not feasible as the effect of an "influencer" could easily be felt over a state boundary. Yet, political boundaries do not form impermeable barriers.

A logical way of measuring the effect of influencing agents on HSGP adoption is by nearest neighbor analysis. This statistic incorporates the distance from a selected phenomena Y (school system using HSGP materials) to a selected phenomena X (location of a trial teacher, unit author, Steering Committee member, Research Personnel Workshop attender). If X and Y are spatially related, there will be a non-random distribution of X about Y. That is, if there is a relationship spatially between school systems using HSGP materials and the location of influencing agents, there will be a minimum distance pattern of influencing agents from HSGP using school systems. Where one finds an influencing agent close by, one would expect to find a school system using HSGP materials.

A method of quantitatively measuring the spacing of phenomena by means of nearest neighbor analysis was developed by Clark and Evans in 1954. They used the distance between nearest neighbors to measure departure from randomness for a given spatial phenomena. The methodology basically

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involves determining the ratio of the observed average distance from all the phenomena to their nearest neighbor to the expected average distance of all the phenomena to their nearest neighbors. Expressed algebraically:

$$R = \frac{\bar{r}_a}{\bar{r}_e}$$

where

$$\bar{r}_a = \frac{\sum r}{N}$$ (the mean of the series of distances to nearest neighbor)

when

$\sum r$ = the summation of the measurements of distance to nearest neighbor

N = the number of measurements of distance taken in the observed population or sample

a = the distances between nearest neighbors

and where

$$\bar{r}_e = \frac{1}{2\sqrt{p}}$$ (the mean distance to nearest neighbor expected in an infinitely large random distribution of density rho)

when

p = the density of the observed distribution expressed as the number of individuals per unit area

e = the expected distances to nearest neighbors in a random distribution of density rho

If the distribution is random, the ratio will be 1.00. Under conditions of maximum concentration or agglomeration, the ratio would be 0.00, since all the observations would occupy the same locus and the distance between nearest

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neighbors would be zero. Under conditions of maximum spacing, the ratio would be largest and have a value of 2.149. It can be seen, then, that R has a limited range, with values indicative of uniformity, randomness, and complete agglomeration. In a given distribution, the mean observed distance to nearest neighbor is R times as great as would be expected in a random distribution of the same density. An R valus of 0.5 would indicate that nearest neighbors are half as far apart as would be expected under conditions of randomness.[18] With this in mind, a scale can be constructed for measuring actual distribution patterns:[19]

0.0	1.0	2.149
Total Agglomeration	Random Distribution	Uniform

Applying this formula to school systems using HSGP materials with influencing agents as their nearest neighbors, a measure of the inter-relationship between the two phenomena can be gained. If there is, in fact, a spatial relationship between the location of influencing agents and school systems using HSGP materials, then an R value between 0.00 and 1.00 should be obtained. If there is no spatial relationship, then an R value between 1.00 and 2.149 will be obtained.

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[18] P. J. Clark and F. C. Evans, "Distance to Nearest Neighbor as a Measure of Spatial Relationships in Populations," Ecology, XXXV (1954), pp. 445-453.

[19] P. J. Clark and F. C. Evans, p. 447.

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Distance measurements between the location of school systems using HSGP materials and influencing agents were made on an enlarged map of the United States at a scale of 1 : 90. An acetate overlay was used on which the location of influencing agents and HSGP adopting school systems were plotted. Measurements of distances between influencing agents and HSGP adopting school systems were made irrespective of direction. With each measurement, a notation was made as to whether the nearest neighbor was a trial teacher, RPW attender, unit author or consultant, or Steering Committee member. Trial teachers and RPW attenders are directly involved in high school classrooms and it was assumed that of the four groups of influencers, they would be most closely associated with HSGP adoption.

The total distance in miles between influencing agents and HSGP adoptors was determined to be 6407.2 miles. There were 222 school systems in 37 states using HSGP materials. The area of the United States (less Alaska and Hawaii) is 3,082,809 square miles. Substituting these values into the nearest neighbor formula, an R value of 0.4868 was obtained. This value indicates that the distance between influencing agents and HSGP adoptors is <u>less than half</u> as far apart as would be expected under conditions of randomness. The R value does point to a spatial relationship between HSGP adoption and influencing agents. Figures 1 and 5 show a very similar pattern between the location of

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influencing agents and school systems using HSGP materials. If a few of the extreme distance measurements could be eliminated, as occur in Montana, North Dakota, and Nebraska, an R value much closer to zero and more indicative of agglomeration would be obtained. One nearest neighbor measurement of 100 miles offsets the agglomerating influence of 20 nearest neighbors, each less then one mile from an HSGP adoptor. It can generally be said, therefore, that the nearest neighbor relationship is probably stronger than the R value indicates.

It was assumed earlier that trial teachers, because of their direct involvement with HSGP materials in their classrooms, would be more prevalent as nearest neighbors than would be Steering Committee members, unit authors and consultants, or RPU attenders. Records made of the nearest neighbor measurements revealed that RPU attenders were the nearest neighbors for 39 of the 222 HSGP using school systems, or 18 per cent. Unit author-consultants and Steering Committee members were nearest neighbors for 31 of the 222 HSGP using school systems, or 14 per cent. In 68 per cent of the cases, or 152 of the school systems using HSGP materials, trial teachers were the nearest neighbors. It should be noted that of all the influencing agents, trial teachers were the most numerous. This fact alone increases the likelihood that they would be nearest neighbors.

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It was mentioned earlier that Wisconsin, Delaware, and New Jersey were the only three states with more than their share of HSGP adoptors, but less than their share of both school system wealth and geography teachers. Mention was made of the possibility of influencing agents being important factors in HSGP adoption in these states. Table 5 shows that influencing agents are indeed present in Wisconsin, Delaware and New Jersey. Kenosha and Wauwatosa, Wisconsin, contain school systems using HSGP materials. Wauwatosa, Kenosha, and West Allis contain trial teachers. In Delaware, Wilmington contains an HSGP using school system as well as an RPU attender. Newark also contains an RPU attender. Table 5 shows that New Jersey contains fifteen trial teachers, more than most states. Four locations, Edison, South River, Hightstown, and Woodbridge, contain trial teachers and HSGP using school systems. Although cause and effect cannot be directly implied, a spatial relationship can be observed in Delaware, Wisconsin, and New Jersey between the location of school systems using HSGP materials and influencing agents.

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SUMMARY AND CONCLUSION

This study has shown that the diffusion of the HSGP innovation has not occurred randomly. Minimally, it seems to be related to the presence of individuals who were involved with the developmental and experimental stages of the project and to school system wealth. Results also have shown the mere presence of geography teachers to be a marginal, perhaps non-functioning, factor affecting HSGP adoption.

It appears that of those examined the factor most responsible for the spread and adoption of the HSGP innovation is the potential users exposure to the materials. This is evidenced by the strong relationship found between the location of influencing agents and HSGP adoptors. Where one finds those who have been exposed to HSGP materials, one finds these materials being used with marked consistency. The old adage "seeing is believing" appears to apply well to the HSGP innovation. This is partially supported by the fact that several regional concentrations of HSGP adoptors and of influencing agents exist in the United States (see Figures 1 and 5). Outward from these concentrations the adoption of HSGP materials steadily decreases. It appears that areas that do not include individuals who have been exposed to the HSGP innovation tend not to adopt HSGP materials. It also appears that school systems that are not "prodded" by someone who has been exposed to the project do not adopt the project materials.

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Analysis also revealed the presence of HSGP adoptors in the United States to be moderately related to the financial status of various school systems. While the statistical relationship was weak, Tables 2 and 3 show somewhat of a threshold phenomena. States with their share or more than their share of HSGP adoptors also tend to have more than their share of wealth.

While a statistical relationship between the presence of geography teachers and HSGP adoption was not found, a visual examination of the data reveals an interesting characteristic. The states listed in approximately the upper one-third of Tables 2 and 4 are remarkably similar. It would appear, therefore, that here, as in the case of school system wealth, a threshold phenomenon might be functioning.

While the relationships discussed above exist, it must be remembered that there are a number of other factors effecting HSGP adoption that are neither easily identified nor easily measured. In the United States, in a day of rapid transportation and easy communication, physical barriers play little or no role in blocking the spread of an innovation. Consequently, it could be argued that diffusion of the HSGP innovation is primarily dependent upon individuals making decisions to adopt or reject. From this it follows that barriers to the HSGP innovation lie mainly in the minds of men. Psychological and personality factors may well be the

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significant determiners in ascertaining whether innovations are used or rejected.

In school systems, the key individuals in the change process are superintendents, high school principals, and classroom teachers. Although each probably plays a different role in a system's decision making procedure, there is little doubt that similar psychological and personality factors are operating in each individual. Change, for example, for the individual means creating a degree of dissonance. In some cases, introduction of an innovation such as HSGP materials creates a threatening or even a psychologically intolerable situation. Particularly in the case of the classroom teacher, the individual becomes startlingly aware of the incongruity between the teaching behaviors suggested by the HSGP materials and those which they regularly exhibit in their classroom. The resulting dissonance is often reflected in teacher attitudes of "the materials are too expensive," "the students don't like them," "I've been using these techniques all along," and so on.

In addition to the dissonance created by personal emotions on whether or not to change, school personnel are beset by outside pressures to incorporate other innovations into the curriculum. This societal pressure to handle a number of changes simultaneously may produce an overload, thus precluding the introduction of yet another change.

The psychological and personality factors just mentioned cannot be measured from printed data. One must be

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auers that reasons for the use or non-use of HSGP materials can be defined in general terms, but underlying psychological factors may be, and perhaps often are, significant in the decision to adopt or not adopt HSGP materials. Perhaps further research should be undertaken to ascertain the underlying factors which exist at micro-levels. In any case, reports from students and educators who have worked with the HSGP materials indicate that these people prefer the openness and actual involvement characteristic of the materials over the usual textbook approach. This should be reason enough to study all factors affecting the acceptance or rejection of an innovation which has led to the significant improvement of a discipline that has long taken a back seat in the high school curriculum.

While it is not the purpose of this study to discuss how the HSGP innovation may best be diffused, it appears that advocates of the HSGP concept might realize that exposure is probably the single most important factor in bringing about adoption of HSGP materials. Attempts at greater exposure of the materials, perhaps through more extensive use of trial teachers and more numerous Research Personnel Workshops, might be worthwhile.

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APPENDIX

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TABLE 1

LOCATION OF PUBLIC SECONDARY SCHOOL SYSTEMS USING HIGH SCHOOL GEOGRAPHY PROJECT MATERIALS OCTOBER, 1970[a]

Ranked by State

1 California

Concord
Corte Madera
Escondido
Fall River
Gilroy
Hanford
Huntington
La Mesa
Ontario
Oxnard
Redwood
Truckee
Tuolumne
San Jose
San Mateo
Santa Rosa
Union City
Vallejo
Watsonville
Woodlake

2 Minnesota

Anoka
Bloomington
Buffalo
Cloquet
Columbus Heights
Ellen Prairie
Edina
Fridley
Janesville
Hopkins
Mound
Minneapolis
Moorhead
Princeton
New Ulm
Rochester
St. Clair
Wayzata
West St. Paul

3 Illinois

Arcola
Benson
Carpentersville
Dolton
East Peoria
Elgin
Glen Ellyn
Granite City
Jacksonville
La Grange
Maywood
Oak Lawn
Oak Park
Park Forest
Park Ridge
St. Charles
Winnetka
Skokie

4s[b] Iowa

Atlantic
Blairsburg
Britt
Council Bluffs
Cedar Rapids
Des Moines
Iowa City
Maynard
Cedar Falls
Greenfield
Monticello
Pleasant Valley
Shenandoah
Toma
Webster

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TABLE 1
Continued

4b Massachusetts

- Attleboro
- Avon
- Brockton
- Haverhill
- Hingham
- Holden
- Ipswich
- Dartmouth
- Melrose
- North Easton
- Plymouth
- Shelburne Falls
- Somerville
- Warren
- West Bridgewater

5 New Jersey

- Closter
- Dumont
- Edison
- Elizabeth
- Hightstown
- Middletown
- Montclair
- Mt. Holly
- Ridgewood
- South River
- Springfield
- Succasunna
- Trenton
- Woodbridge

6 Pennsylvania

- Denver
- Erie
- Fredericksburg
- Glenshaw
- Longhorne
- McMurray
- Ridgway
- Shippensburg
- Wayne
- West Chester
- Wilkes-Barre
- Williamsport
- Williamstown

7 Ohio

- Akron
- Avon Lake
- Berea
- Bowling Green
- Cincinnati
- Cleveland
- Columbus
- Mansfield
- Marion
- Parma
- Toledo
- Youngstown

8 Wisconsin

- Clintonville
- Cuba City
- Kenosha
- Madison
- Marinette
- Manitowa
- Milwaukee
- Oconomowoc
- Union Grove
- Wauwatosa
- Racine

9a Indiana

- Bremen
- Elkhart
- Evansville
- Michigan City Area Schools
- Portage
- Roseville
- Valparaiso
- West Lafayette

9b Michigan

- Ann Arbor
- Berkley
- Detroit
- Lansing

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TABLE 1
Continued

9b Michigan (Cont.)

Muskegon
Pinconning
Plymouth
Warren

10a Colorado

Boulder
Denver
Crainia
U.S.A.F.
Idaho Springs
Westminster

10b Connecticut

Bridgeport
Danbury
Darien
Plainfield
Ridgefield
Windsor

10c Nebraska

Bellevue
Broken Bow
Friend
Lincoln
Milford
Omaha

11a New York

Armonk
Fredonia
Huntington
Lafayette
Rochester

11b Washington

Bellevue
Bothell
Big Harbor
Kelso
Kennewick

12a Oregon

Cottage Grove
Eugene
Monmouth
Portland

12b Virginia

Alexandria
Arlington
Fairfax
Hillsville

13a Delaware

Camden
New Castle
Wilmington

13b Florida

Gainesville
Panama City
Punta Gorda

13c Maryland

Bel Air
Brooklandville
Towson

13d Utah

Brigham City
Tremonton
Roosevelt

14a Georgia

Atlanta
Cartersville

14b Missouri

Conception Jt.
Maryville

14c South Carolina

Columbia
Winnsboro

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TABLE 1
Continued

14d West Virginia
Charleston
Kingwood

14e Wyoming
Douglas
Raulins

15a Arizona
Phoenix

15b Kansas
Shawnee Mission

15c Montana
Kalispell

15d New Hampshire
Lebanon

15e North Carolina
Whiteville

15f North Dakota
Grand Forks

15g Oklahoma
Tulsa

15h Tennessee
Kingsport

15i Texas
Houston

[a]Source: Personal letter from John Snyder, Marketing Manager, Macmillan Company, to George Vuicich, November, 1970.

[b]Ties in ranking were distinguished by including a letter with the numerical rank. For example, Iowa and Massachusetts were tied and were therefore ranked 4a and 4b.

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TABLE 2

DISTRIBUTION OF PUBLIC SECONDARY SCHOOL SYSTEMS USING HIGH SCHOOL GEOGRAPHY PROJECT MATERIALS, BY STATE, EXPRESSED BY LOCATION QUOTIENT[b]

	State	Location Quotient		State	Location Quotient
1	Maryland	6.50	4	Vermont	.72
	Delaware	6.15		New Hampshire	.67
	Utah	3.75		Arizona	.57
	Massachusetts	2.98		Georgia	.49
	California	2.78		New York	.42
	New Jersey	2.62		Tennessee	.39
	Connecticut	2.44		Missouri	.32
	Minnesota	2.24		North Carolina	.31
	Florida	2.23		Montana	.28
				North Dakota	.18
2	West Virginia	1.71		Kansas	.16
	Colorado	1.68		Oklahoma	.10
	Iowa	1.56		Texas	.04
	Virginia	1.56		South Dakota	.00
	Illinois	1.46		Rhode Island	.00
	Wyoming	1.30		New Mexico	.00
	Wisconsin	1.35		Nevada	.00
	Indiana	1.25		Maine	.00
	Pennsylvania	1.23		Idaho	.00
	Oregon	1.06		Arkansas	.00
	South Carolina	1.01		Alabama	.00
				Mississippi	.00
3	Washington	.94			
	Ohio	.90			
	Nebraska	.86			
	Michigan	.76			

[b]Number of schools in each state derived from: U.S. Department of Health, Education, and Welfare, [illegible] Directory, 1970-71: [illegible]. (Washington, D.C.: U.S. Government Printing Office, 1971), p. 8.

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TABLE 3

LOCATION QUOTIENTS OF PUBLIC SECONDARY SCHOOL WEALTH, BY STATE[c]

	State	Location Quotient		State	Location Quotient
1	Maryland	14.13	3	Cont.	
	Florida	6.13		New Mexico	.92
	Louisiana	4.06		Washington	.87
	New York	2.61		Illinois	.76
	Virginia	2.43		Wisconsin	.75
	Nevada	2.28		Mississippi	.75
	Utah	2.21			
	West Virginia	1.89	4	Texas	.59
	South Carolina	1.68		Kansas	.56
	California	1.66		Missouri	.49
	North Carolina	1.62		Minnesota	.49
				Oregon	.48
2	Georgia	1.53		Arizona	.47
	Alabama	1.46		Iowa	.46
	Tennessee	1.41		Idaho	.40
	Pennsylvania	1.39		Arkansas	.29
	Rhode Island	1.38		New Hampshire	.28
	Connecticut	1.34		Maine	.28
	Michigan	1.30		Oklahoma	.24
	Ohio	1.21		Wyoming	.22
	Indiana	1.20		Delaware	.19
	Massachusetts	1.07		South Dakota	.17
				Vermont	.14
3	New Jersey	.96		North Dakota	.12
	Kentucky	.93		Montana	.08
	Colorado	.93		Nebraska	.06

[c]Data used from: U.S. Department of Health, Education, and Welfare, Education Directory, 1970-71: Public School Systems. (Washington, D.C.: U.S. Government Printing Office, 1971), p. 8.

U.S. Department of Health, Education and Welfare, Statistics of State School Systems, 1967-68. (Washington, D.C.: U.S. Government Printing Office, 1970), pp. 48-49.

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TABLE 4

LOCATION QUOTIENTS OF GEOGRAPHY TEACHERS IN PUBLIC SECONDARY SCHOOLS, BY STATE[a]

	State	Location Quotient		State	Location Quotient
1	North Dakota	1.55	3	North Carolina	.97
	West Virginia	1.53		Nevada	.97
	Oregon	1.45		Florida	.96
	Nebraska	1.29		Idaho	.94
	Arkansas	1.29		Wisconsin	.94
	Ohio	1.29		Vermont	.90
	Washington	1.27		New Mexico	.88
	Wyoming	1.27		Rhode Island	.86
	Colorado	1.25		Delaware	.85
	Michigan	1.24		Louisiana	.85
	Arizona	1.22			
	Oklahoma	1.19			
	California	1.16			
	Minnesota	1.16			
2	Iowa	1.15	4	Texas	.84
	Kansas	1.15		South Carolina	.83
	Montana	1.15		Connecticut	.79
	Kentucky	1.11		Missouri	.79
	Utah	1.11		Pennsylvania	.75
	Virginia	1.11		New Hampshire	.74
	Tennessee	1.09		New York	.71
	South Dakota	1.07		Mississippi	.69
	Illinois	1.06		Alabama	.68
	Massachusetts	1.03		New Jersey	.55
	Maryland	1.02			
	Indiana	1.01			
	Georgia	1.00			
	Maine	1.00			

[a]Data from : U.S. Registry of Junior and Senior High School Teaching Personnel in Science, Math matics, and Social Sciences. (Washington, D.C.: National Science Teachers Association, 1971).

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TABLE 5

LOCATION OF TRIAL TEACHERS, UNIT AUTHORS AND CONSULTANTS, STEERING COMMITTEE MEMBERS, AND RESEARCH PERSONNEL WORKSHOP ATTENDERS IN THE CONTIGUOUS UNITED STATES[e]

State	T.T.	U.A.-C./S.C.	R.P.W.
Ohio	Columbus Kettering Cincinnati Middletown Reynoldsburg Hamilton Gahanna Stivers Cleveland Dublin Dayton Groveport Marion Canal Winchester Hilliard Fairfield City Worthington Xenia New Albany Oxford	Columbus Cincinnati	
Massachusetts	Mt. Hermon Worcester North Quincy West Boyleston Cohasset Wellesley Newtonville Lexington Easthampton Framingham	Princeton	Somerville
Colorado	Denver Englewood Fort Collins Broomfield Arvada Louisville	Denver Boulder	Boulder

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TABLE 5
Continued

State	T.T.	U.A.-C./S.C.	R.P.U.
Michigan	Detroit Fraser	Kalamazoo Ypsilanti Ann Arbor	Fraser Livonia Lansing Grand Rapids Portage
Minnesota	Minneapolis	Duluth	Moorhead Mankato
Montana	Glindive		
New Hampshire	Lebanon		
New York	DeWitt	Syracuse New York City Poughkeepsie	Rochester
North Carolina	Fayetteville	Chapel Hill	Raleigh Durham
Oregon	Cottage Grove Salem Eugene Halsey	Monmouth Eugene	
New Mexico			Albuquerque
Wisconsin	Kenosha Wauwatosa West Allis	Madison	
Washington	Seattle Deming Mt. Vernon Concrete Des Moines Kennewick Stanwood Spokane	Seattle	Spokane
Oklahoma			Tulsa
Florida	Melbourne	Gainesville	Tallahassee

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TABLE 5
Continued

State	T.T.	U.A.-C./S.C.	R.P.U.
Georgia	Atlanta Napeville East Point Fairburn	Athens	Atlanta
New Jersey	Hightstown South River Monmouth Jct. Linden Woodbridge Englewood Red Bank Willingboro North Bergen Edison New Brunswick Oakland Union Asbury Park Lakewood		Cherry Hill
Illinois	Carbondale Marion Shawneetown Herrin Wateeka Joliet De Quoin Fairfield Chicago Des Plaines Northfield Westville Alton Wayne City Champaign	Rockford Carbondale	
Indiana	New Albany Indianapolis		Michigan City
Iowa	Cedar Falls Des Moines	Iowa City Cedar Rapids	Monticello
Kansas	Wichita	Lindsborg Laurence	Shawnee Mission Prarie Village Emporia

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TABLE 5
Continued

State	T.T.	U.A.-C./S.C.	R.P.U.
Louisiana	Baton Rouge	Baton Rouge	Shreveport
Maryland	Baltimore (Prince George County)		
Connecticut	Wethersfield	New Haven	
California	San Diego Livermore Redwood City Borrego Daly City San Francisco Escondido Poway Pleasant Hill El Cajon Fremont San Mateo Chula Vista Santa Cruz	Berkeley Riverside Northridge Anaheim	Santa Clara Bakersfield Newport Beach Chico San Diego
Pennsylvania	Chesvick Philadelphia West Chester	Indiana University Park Pittsburgh	Erie
South Carolina	Central		
Tennessee	Johnson City	Nashville	
Texas	Amarillo Austin		
Utah	Salt Lake City		Logan
Virginia	Bassat		
North Dakota		Grand Fork	Fargo
Vermont	Burlington		
Rhode Island	Kingston		

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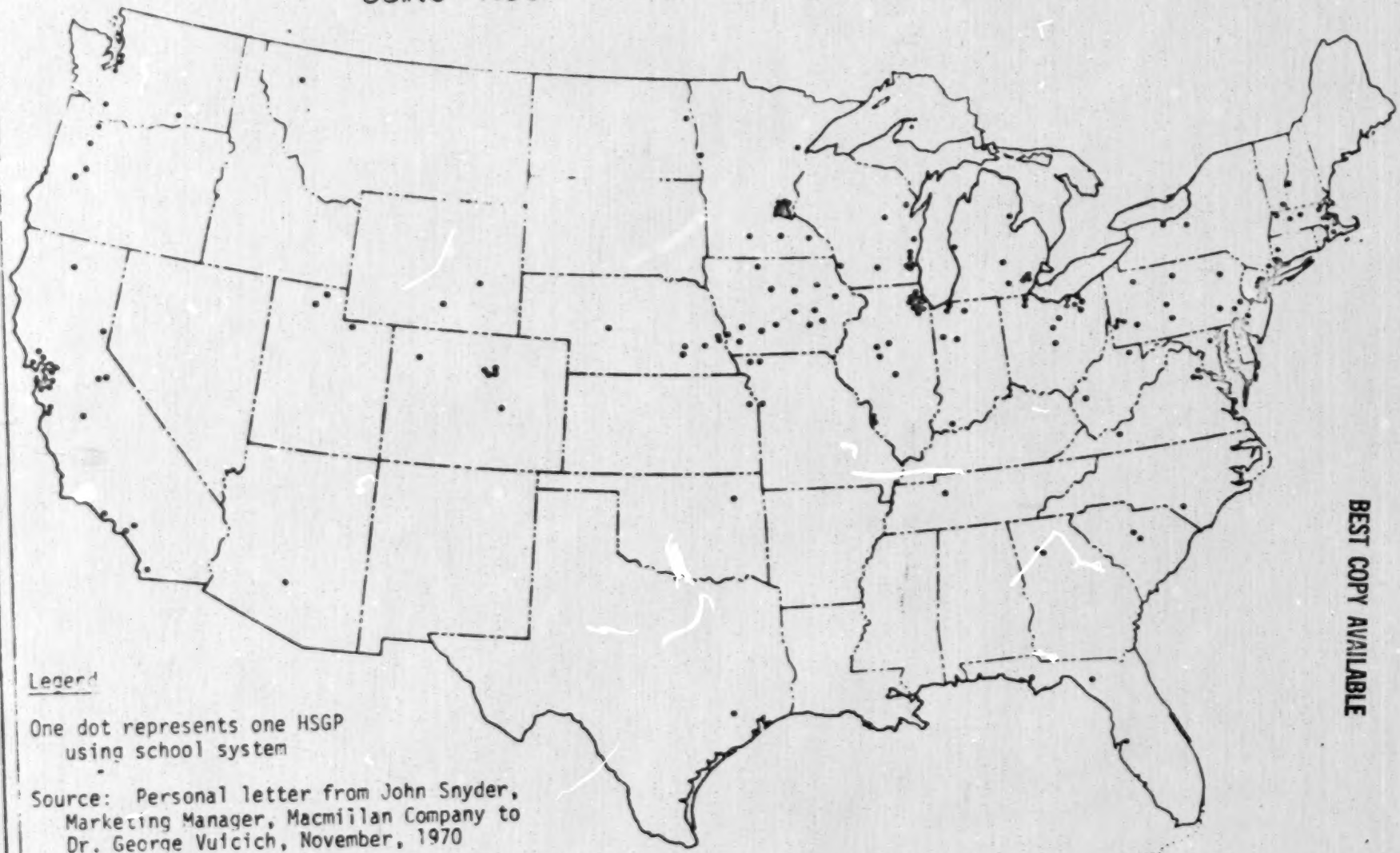
TABLE 5
Continued

State	T.T.	U.A.-C./S.C.	R.P.U.
Delaware			Newark Wilmington
Arizona			Scottsdale Phoenix Tucson Tempe
Nevada			Las Vegas
Missouri			Kansas City

[e] Source: Geography in an Urban Age. Units 1, 2, 3, 4, 5, and 6. Macmillan Company, 1970.

Personal interview with Dr. George Vuicich, December, 1971.

DISTRIBUTION OF PUBLIC SECONDARY SCHOOL SYSTEMS USING HSGP MATERIALS - OCTOBER, 1970



Legend

One dot represents one HSGP using school system

Source: Personal letter from John Snyder, Marketing Manager, Macmillan Company to Dr. George Vuicich, November, 1970

Figure 1

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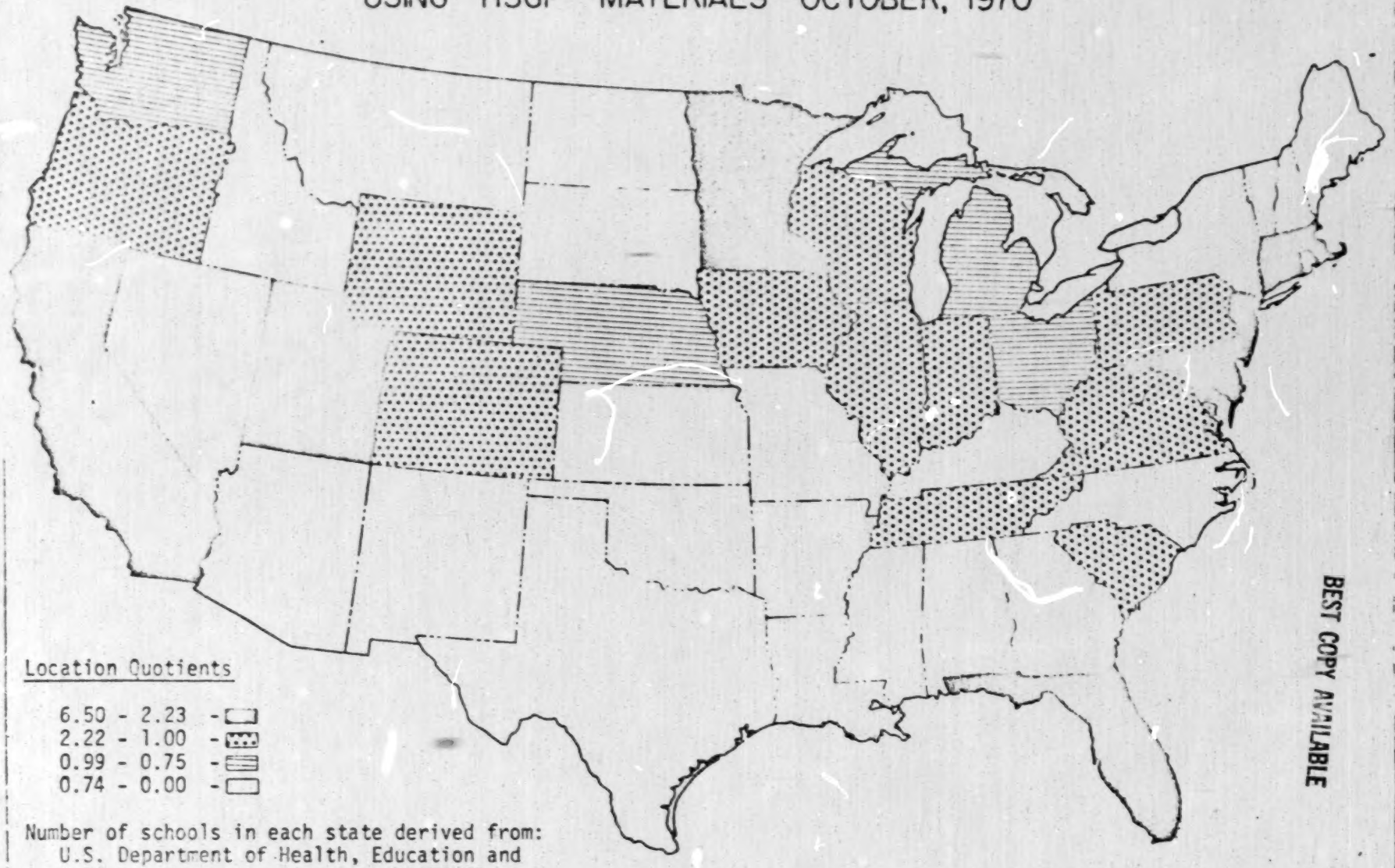
DISTRIBUTION OF PUBLIC SECONDARY SCHOOL SYSTEMS USING HSGP MATERIALS - OCTOBER, 1970



Number of schools in each state derived from:
U.S. Department of Health, Education and Welfare, Education Directory, 1970-71

Figure 2

Dept of Geography — Univ of Illinois

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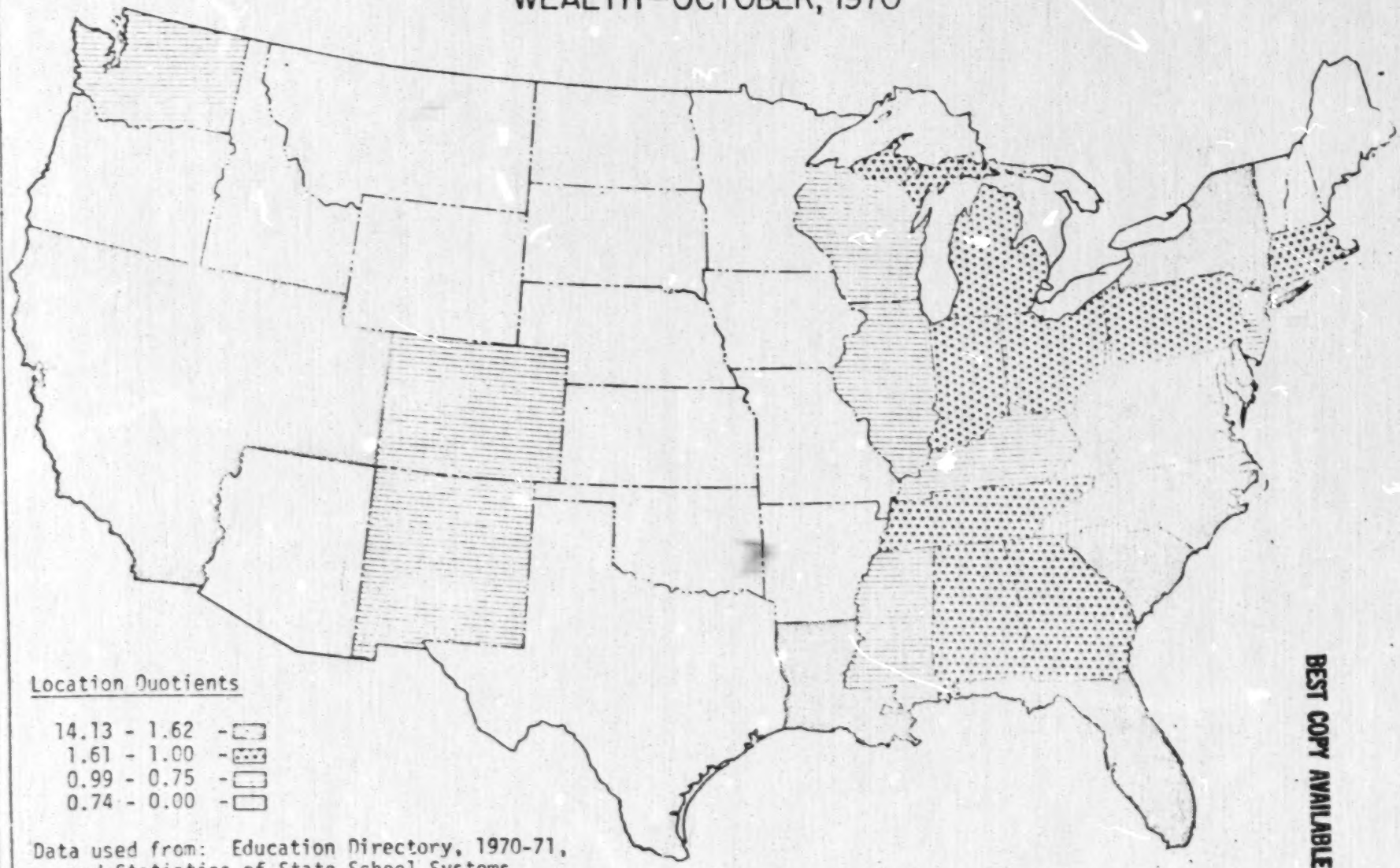
DISTRIBUTION OF PUBLIC SECONDARY SCHOOL SYSTEM WEALTH - OCTOBER, 1970



Location Quotients

14.13 - 1.62
1.61 - 1.00
0.99 - 0.75
0.74 - 0.00

Data used from: Education Directory, 1970-71, and Statistics of State School Systems, 1967-68, U.S. Department of Health, Education and Welfare

Figure 3

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DISTRIBUTION OF GEOGRAPHY TEACHERS IN PUBLIC SECONDARY SCHOOL SYSTEMS, 1970

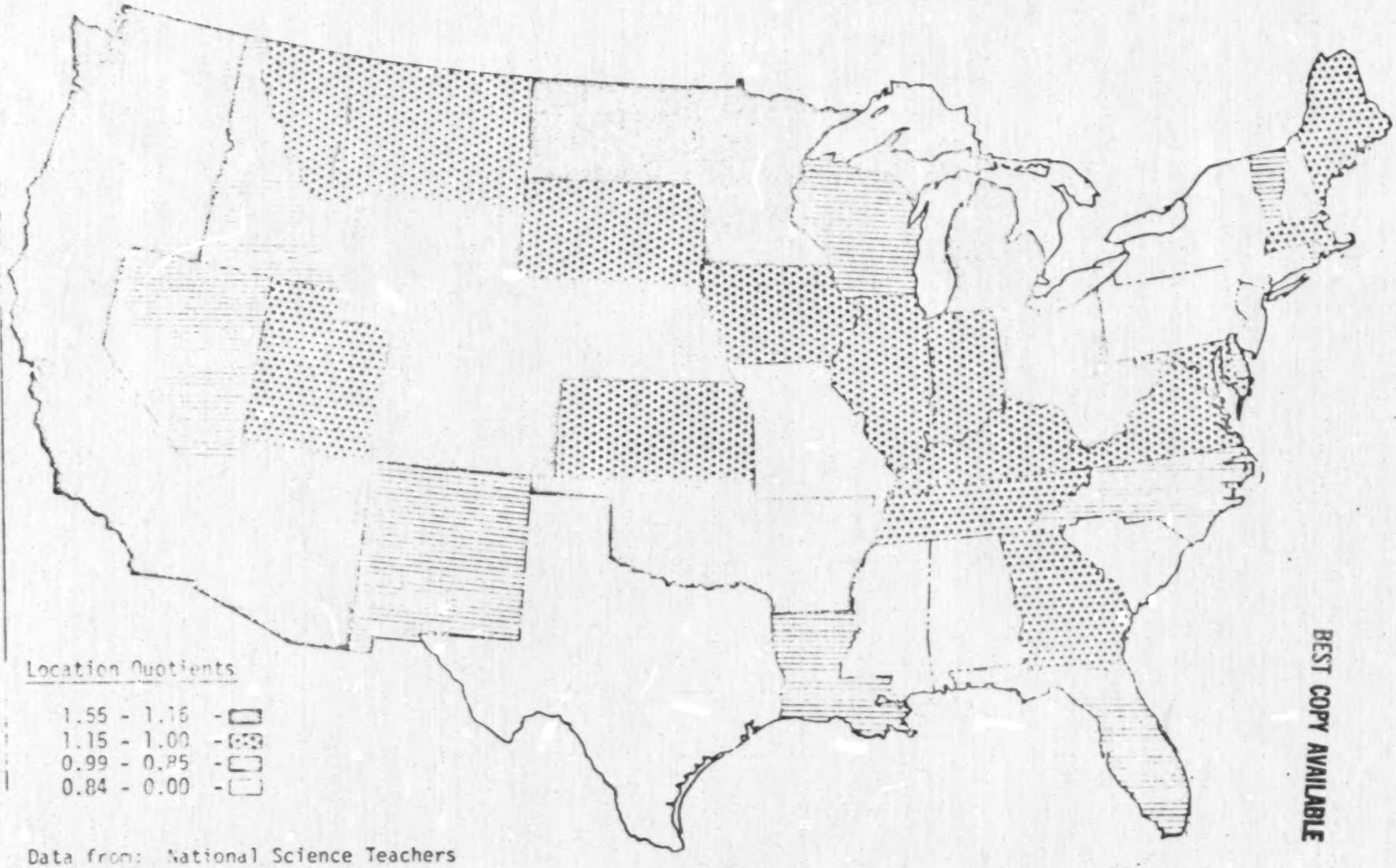

Figure 4

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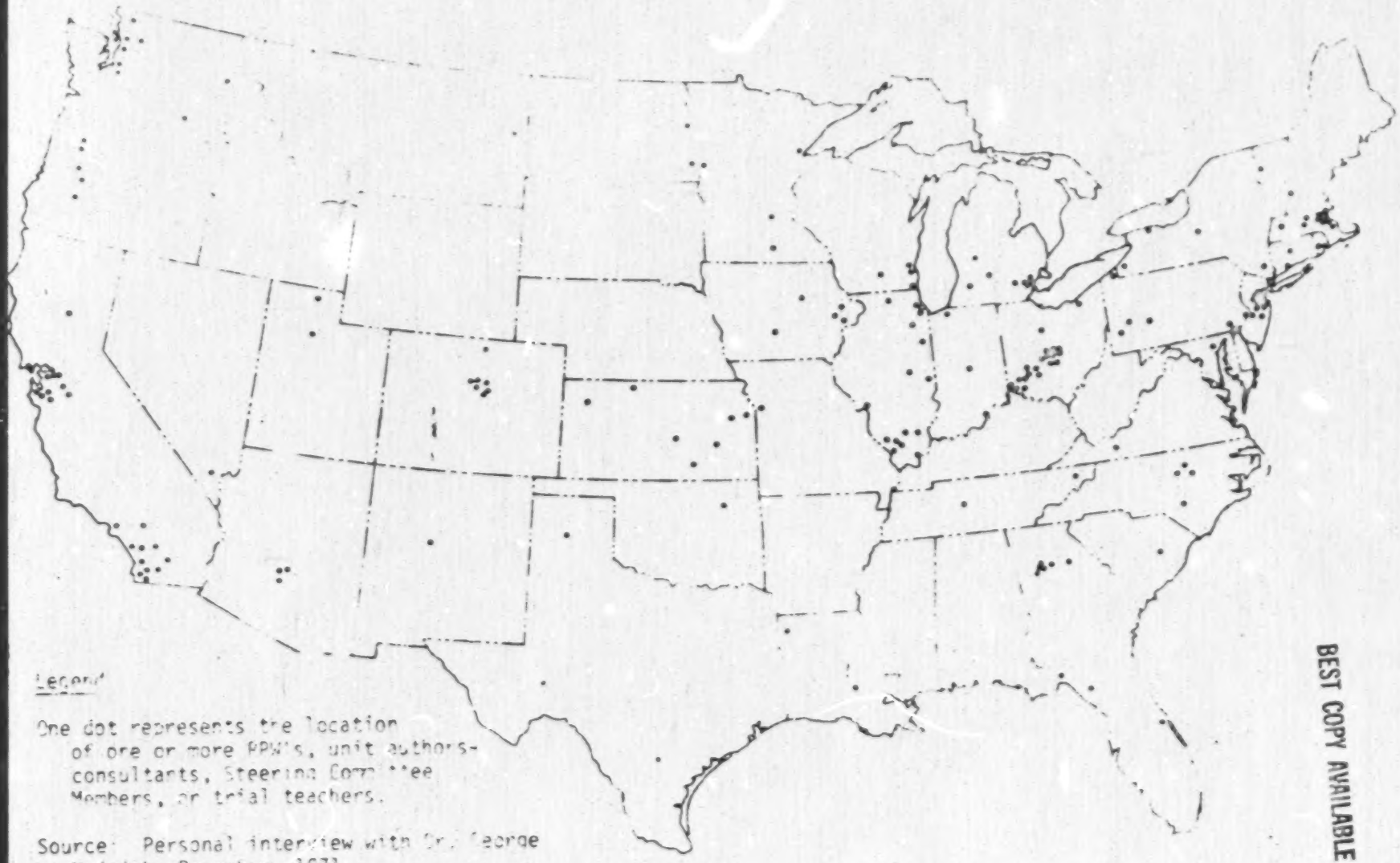
LOCATION OF RESEARCH PERSONNEL WORKSHOP ATTENDERS, UNIT AUTHORS AND CONSULTANTS, STEERING COMMITTEE MEMBERS, AND TRIAL TEACHERS



Legend

One dot represents the location of one or more RPW's, unit authors-consultants, Steering Committee Members, or trial teachers.

Source: Personal interview with Dr. George Vuicich, December, 1971

Figure 5

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